



# SPEC® MPIL2007 Result

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## Intel Corporation

Endeavor (Intel Xeon Gold 6148, 2.40 GHz, DDR4-2666 MHz, SMT on, Turbo on)

SPECmpiL\_peak2007 = Not Run

SPECmpiL\_base2007 = 99.9

MPI2007 license: 13

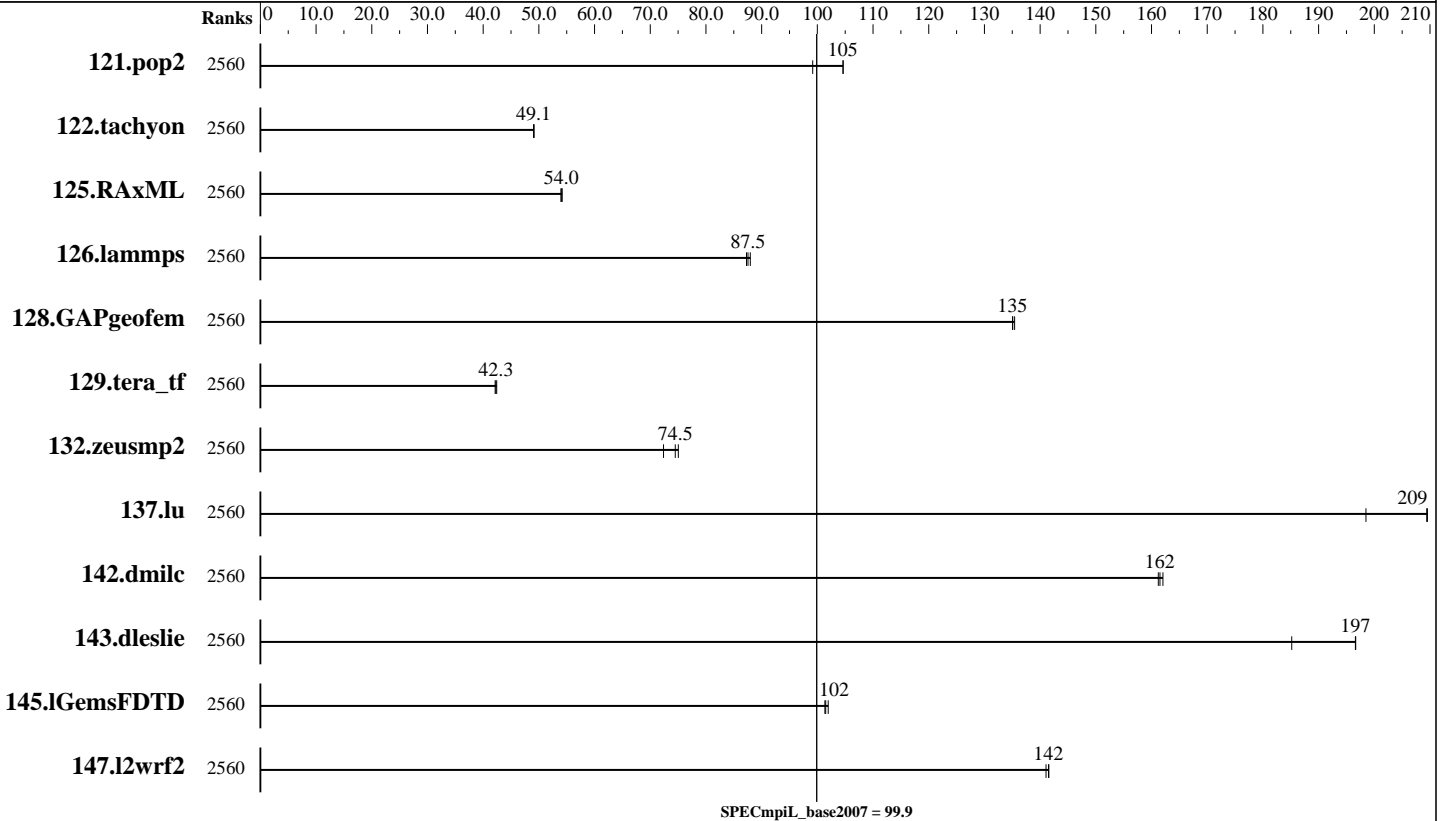
Test sponsor: Intel Corporation

Tested by: Intel Corporation

Test date: Aug-2018

Hardware Availability: Aug-2018

Software Availability: Nov-2018



## Results Table

Benchmark	Base							Peak						
	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Ranks	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
121.pop2	2560	39.2	99.2	<u>37.2</u>	<u>105</u>	37.2	105							
122.tachyon	2560	<u>39.6</u>	<u>49.1</u>	39.6	49.1	39.6	49.1							
125.RAxML	2560	54.1	54.0	<u>54.0</u>	<u>54.0</u>	53.9	54.2							
126.lammps	2560	<u>28.1</u>	<u>87.5</u>	28.0	88.0	28.2	87.3							
128.GAPgeofem	2560	43.8	135	<u>43.9</u>	<u>135</u>	43.9	135							
129.tera_tf	2560	26.1	42.2	<u>26.0</u>	<u>42.3</u>	25.9	42.4							
132.zeusmp2	2560	28.3	75.0	<u>28.5</u>	<u>74.5</u>	29.3	72.4							
137.lu	2560	<u>20.1</u>	<u>209</u>	21.2	199	20.1	210							
142.dmilc	2560	22.7	162	22.9	161	<u>22.8</u>	<u>162</u>							
143.dleslie	2560	15.8	197	<u>15.8</u>	<u>197</u>	16.7	185							
145.lGemsFDTD	2560	43.3	102	<u>43.5</u>	<u>102</u>	43.5	101							
147.l2wrf2	2560	58.0	142	<u>58.0</u>	<u>142</u>	58.2	141							

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Standard Performance Evaluation Corporation

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http://www.spec.org/



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### Hardware Summary

Type of System: Homogeneous  
 Compute Node: Intel Server System R2208WFTZS  
 Interconnect: Intel Omni-Path 100 series  
 File Server Node: Lustre FS  
 Total Compute Nodes: 64  
 Total Chips: 128  
 Total Cores: 2560  
 Total Threads: 5120  
 Total Memory: 12 TB  
 Base Ranks Run: 2560  
 Minimum Peak Ranks: --  
 Maximum Peak Ranks: --

### Software Summary

C Compiler: Intel C++ Composer XE 2018 for Linux  
 Version 18.0.0 Build 20170811  
 C++ Compiler: Intel C++ Composer XE 2018 for Linux  
 Version 18.0.0 Build 20170811  
 Fortran Compiler: Intel Fortran Composer XE 2018 for Linux  
 Version 18.0.0 Build 20170811  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 MPI Library: Intel MPI Library 2019 Build 20180829  
 Other MPI Info: libfabric-1.6.1  
 Pre-processors: No  
 Other Software: None

## Node Description: Intel Server System R2208WFTZS

### Hardware

Number of nodes: 64  
 Uses of the node: Compute  
 Vendor: Intel  
 Model: Intel Server System R2208WFTZS  
 CPU Name: Intel Xeon Gold 6148  
 CPU(s) orderable: 1-2 chips  
 Chips enabled: 2  
 Cores enabled: 40  
 Cores per chip: 20  
 Threads per core: 2  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.7 GHz  
 CPU MHz: 2400  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 1 MB I+D on chip per core  
 L3 Cache: 27.5 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 192 GB (16 x 12 GB 2Rx4 DDR4-2666)  
 Disk Subsystem: ATA INTEL SSDSC2BA80  
 Other Hardware: None  
 Adapter: Intel Omni-Path Edge Switch 100 series  
 Number of Adapters: 1  
 Slot Type: PCI-Express x16  
 Data Rate: 12.5 GB/s  
 Ports Used: 1  
 Interconnect Type: Intel Omni-Path Fabric 100 series

### Software

Adapter: Intel Omni-Path Edge Switch 100 series  
 Adapter Driver: IFS 10.7  
 Adapter Firmware: 1.26.1  
 Operating System: Oracle Linux Server release 7.4  
 Local File System: Linux/xfst  
 Shared File System: Lustre FS  
 System State: Multi-User  
 Other Software: IBM Platform LSF Standard 9.1.1.1

## Node Description: Lustre FS

### Hardware

Number of nodes: 11  
 Uses of the node: Fileserver  
 Vendor: Intel

### Software

Adapter: Intel Omni-Path Fabric Adapter 100 series  
 Adapter Driver: IFS 10.7  
 Adapter Firmware: 1.26.1

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Software Availability: Nov-2018

### Node Description: Lustre FS

Model: Intel Server System R2208GZ4GC4  
 CPU Name: Intel Xeon E5-2680  
 CPU(s) orderable: 1-2 chips  
 Chips enabled: 2  
 Cores enabled: 16  
 Cores per chip: 8  
 Threads per core: 2  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.5 GHz  
 CPU MHz: 2700  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 2 MB I+D on chip per chip  
 L3 Cache: None  
 Other Cache: None  
 Memory: 64 GB per node (8 x 8 GB 1600MHz Reg ECC DDR3)  
 Disk Subsystem: 136 TB 3 RAID with 8 SAS/SATA  
 Other Hardware: None  
 Adapter: Intel Omni-Path Fabric Adapter 100 series  
 Number of Adapters: 1  
 Slot Type: PCI-Express x16  
 Data Rate: 12.5 GB/s  
 Ports Used: 1  
 Interconnect Type: Intel Omni-Path Fabric 100 series

Operating System: Redhat Enterprise Linux Server Release 7.4  
 Local File System: None  
 Shared File System: Lustre FS  
 System State: Multi-User  
 Other Software: None

### Interconnect Description: Intel Omni-Path 100 series

	Hardware	Software
Vendor:	Intel	
Model:	Intel Omni-Path Fabric 100 series	
Switch Model:	Intel Omni-Path Edge Switch 100 series	
Number of Switches:	24	
Number of Ports:	48	
Data Rate:	12.5 GB/s	
Firmware:	1.26.1	
Topology:	Fat tree	
Primary Use:	MPI and I/O traffic	

### Submit Notes

The config file option 'submit' was used.

### General Notes

130.socorro (base): "nullify\_ptrs" src.alt was used.  
 129.tera\_tf (base): "add\_rank\_support" src.alt was used.  
 143.dleslie (base): "integer\_overflow" src.alt was used.

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## General Notes (Continued)

MPI startup command:

```
mpiexec.hydra command was used to start MPI jobs.  
export I_MPI_FABRICS=shm:ofi  
export FI_PSM2_INJECT_SIZE=8192  
export I_MPI_PIN_DOMAIN=core  
export I_MPI_PIN_ORDER=bunch  
export FI_PSM2_DELAY=0  
export FI_PSM2_LAZY_CONN=1  
export I_MPI_COMPATIBILITY=3
```

Spectre & Meltdown:

```
Kernel: 3.10.0-862.11.6.el7.crt1.x86_64  
Microcode: 0x200004d  
lltf: Mitigation: PTE Inversion  
meltdown: Mitigation: PTI  
spec_store_bypass: Mitigation: Speculative Store Bypass disabled via prctl and seccomp  
spectre_v1: Mitigation: Load fences, __user pointer sanitization  
spectre_v2: Mitigation: IBRS (kernel)
```

BIOS settings:

```
Intel Hyper-Threading Technology (SMT) = Enabled (default is Enabled)  
Intel Turbo Boost Technology (Turbo) = Enabled (default is Enabled)
```

RAM configuration:

Compute nodes have 2x16-GB RDIMM on each memory channel.

Network:

Endeavour Omni-Path Fabric consists of 48-port switches = 24 core switches connected to each leaf of the rack switch.

HFI driver parameters:

```
cache_size = 1024  
rcvhdrCnt = 4096
```

Job placement:

Each MPI job was assigned to a topologically compact set of nodes, i.e. the minimal needed number of leaf switches was used for each job = 1 switch for 40/80/160/320/640 ranks, 2 switches for 1280 and 1980 ranks.

IBM Platform LSF was used for job submission. It has no impact on performance.

Information can be found at: <http://www.ibm.com>

## Base Compiler Invocation

C benchmarks:

```
mpiicc
```

C++ benchmarks:

```
126.lammps: mpiicpc
```

Fortran benchmarks:

```
mpiifort
```

Benchmarks using both Fortran and C:

```
mpiicc mpiifort
```



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## Base Portability Flags

121.pop2: -DSPEC\_MPI\_CASE\_FLAG  
126.lammps: -DMPICH\_IGNORE\_CXX\_SEEK

## Base Optimization Flags

C benchmarks:

-O3 -xCORE-AVX512 -no-prec-div -ipo

C++ benchmarks:

126.lammps: -O3 -xCORE-AVX512 -no-prec-div -ipo

Fortran benchmarks:

-O3 -xCORE-AVX512 -no-prec-div -ipo

Benchmarks using both Fortran and C:

-O3 -xCORE-AVX512 -no-prec-div -ipo

The flags file that was used to format this result can be browsed at

[http://www.spec.org/mpi2007/flags/EM64T\\_Intel140\\_flags.20190110.html](http://www.spec.org/mpi2007/flags/EM64T_Intel140_flags.20190110.html)

You can also download the XML flags source by saving the following link:

[http://www.spec.org/mpi2007/flags/EM64T\\_Intel140\\_flags.20190110.xml](http://www.spec.org/mpi2007/flags/EM64T_Intel140_flags.20190110.xml)

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For questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

Tested with SPEC MPI2007 v2.0.1.  
Report generated on Thu Jan 10 13:17:43 2019 by SPEC MPI2007 PS/PDF formatter v1463.  
Originally published on 10 January 2019.